

CLAIMS

What is claimed is:

1. A transfer case comprising:
 - an input shaft;
 - an output shaft selectively coupled to the input shaft;
 - a planetary gear assembly for transferring drive torque from the input shaft to the output shaft, said planetary gear assembly including a sun gear, a ring gear and a plurality of pinion gears mounted to a common carrier, said sun gear and said ring gear meshing with the plurality of pinion gears;
 - a direct clutch assembly including a first set of clutch plates and a second set of clutch plates, wherein when the clutch assembly is activated, the first and second set of clutch plates are coupled together; and
 - a drum and band assembly including a drum and a band, wherein the band is engaged to prevent the drum from rotating, and wherein the combination of the planetary gear assembly, the direct clutch assembly and the drum and band assembly provide an underdrive gear ratio and a direct drive gear ratio or an overdrive gear ratio and a direct drive gear ratio.
2. The transfer case according to claim 1 wherein the input shaft is coupled to the ring gear, the output shaft is coupled to the carrier and the sun gear is coupled to the first set of clutch plates and the drum, and wherein engaging the band couples the sun gear to ground to provide the underdrive gear ratio from the ring gear through the carrier

to the output shaft, and wherein activating the clutch assembly couples the sun gear to the ring gear to provide the direct drive gear ratio from the input shaft to the output shaft.

3. The transfer case according to claim 2 wherein the underdrive gear ratio is 1.61:1.

4. The transfer case according to claim 3 wherein the underdrive gear ratio provides an overall gear ratio range of 5.32:1 in combination with a vehicle transmission.

5. The transfer case according to claim 1 wherein the transfer case provides an underdrive gear ratio or an overdrive gear ratio selected from the group consisting of 2.64:1, 1.61:1, 0.60:1, 0.40:1, 2.48:1, 1.67:1 and 0.60:1.

6. The transfer case according to claim 1 wherein the transfer case provides a vehicle drive mode for all-wheel drive and two-wheel drive.

7. The transfer case according to claim 1 wherein the underdrive gear ratio or the overdrive gear ratio is selectively engaged either automatically or by a operator input switch.

8. A drive train for a vehicle, said drive train comprising:

a vehicle transmission, said vehicle transmission including a plurality of gears that provide a plurality of gear ratios and a set gear range, said transmission driving a transmission output shaft; and

a gear box assembly including a gear box input shaft and a gear box output shaft, said gear box input shaft being coupled to the transmission output shaft, said gear box assembly also including a plurality of gears defining a selectable gear ratio where the gear ratio of the gear box assembly combines with the vehicle transmission to extend the gear ratio range of the vehicle by providing an underdrive gear ratio and a direct drive gear ratio or an overdrive gear ratio and a direct drive gear ratio.

9. The drive train according to claim 8 wherein the gear box assembly includes a planetary gear assembly for transferring drive torque from the gear box input shaft to the gear box output shaft, said planetary gear assembly including a sun gear, a ring gear and a plurality of pinion gears mounted to a common carrier, said sun gear and said ring gear meshing with the plurality of pinion gears.

10. The drive train according to claim 9 wherein the gear box assembly further includes a direct clutch assembly including a first set of clutch plates and a second set of clutch plates, wherein when the clutch assembly is activated, the first and second set of clutch plates are coupled together.

11. The drive train according to claim 10 wherein the gear box assembly further includes a drum and band assembly including a drum and a band, wherein the band is engaged to prevent the drum from rotating, and wherein the combination of the planetary gear assembly, the direct clutch assembly and the drum and band assembly provide the underdrive gear ratio and the direct drive gear ratio or the overdrive gear ratio and the direct drive gear ratio.

12. The drive train according to claim 11 wherein the gear box input shaft is coupled to the ring gear, the gear box output shaft is coupled to the carrier and the sun gear is coupled to the first set of clutch plates and the drum, and wherein engaging the band couples the sun gear to ground to provide the underdrive gear ratio from the ring gear through the carrier to the output shaft, and wherein activating the clutch assembly couples the sun gear to the ring gear to provide the direct drive gear ratio from the input shaft to the output shaft.

13. The transfer case according to claim 12 wherein the underdrive gear ratio is 1.61:1.

14. The drive train according to claim 12 wherein the underdrive gear ratio provides an overall gear ratio range of 5.32:1 in combination with a vehicle transmission.

15. The drive train according to claim 8 wherein the gear box assembly provides an underdrive gear ratio or an overdrive gear ratio selected from the group consisting of 2.64:1, 1.61:1, 0.60:1, 0.40:1, 2.48:1, 1.67:1 and 0.60:1.

16. A gear box assembly for a vehicle, said gear box assembly comprising:

- an input shaft;
- an output shaft coupled to the input shaft;
- a planetary gear assembly for transferring drive torque from the input shaft to the output shaft, said planetary gear assembly including a sun gear, a ring gear and a plurality of pinion gears mounted to a common carrier, said sun gear and said ring gear meshing with the plurality of pinion gears;
- a direct clutch assembly including a first set of clutch plates and a second set of clutch plates, wherein when the clutch assembly is activated, the first and second set of clutch plates are coupled together; and
- a drum and band assembly including a drum and a band, wherein the band is engaged to prevent the drum from rotating, and wherein the combination of the planetary gear assembly, the direct clutch assembly and the drum and band assembly provide an underdrive gear ratio and a direct drive gear ratio or an overdrive gear ratio and a direct drive gear ratio.

17. The transfer case according to claim 16 wherein the input shaft is coupled to the ring gear, the output shaft is coupled to the carrier and the sun gear is coupled to the first set of clutch plates and the drum, and wherein engaging the band couples the sun gear to ground to provide the underdrive gear ratio from the ring gear through the carrier to the output shaft, and wherein activating the clutch assembly couples the sun gear to the ring gear to provide the direct drive gear ratio from the input shaft to the output shaft.

18. The transfer case according to claim 16 wherein the underdrive gear ratio is 1.61:1.

19. The transfer case according to claim 18 wherein the underdrive gear ratio provides an overall gear ratio range of 5.32:1 in combination with a vehicle transmission.

20. The transfer case according to claim 16 wherein the transfer case provides an underdrive gear ratio or an overdrive gear ratio selected from the group consisting of 2.64:1, 1.61:1, 0.60:1, 0.40:1, 2.48:1, 1.67:1 and 0.60:1.